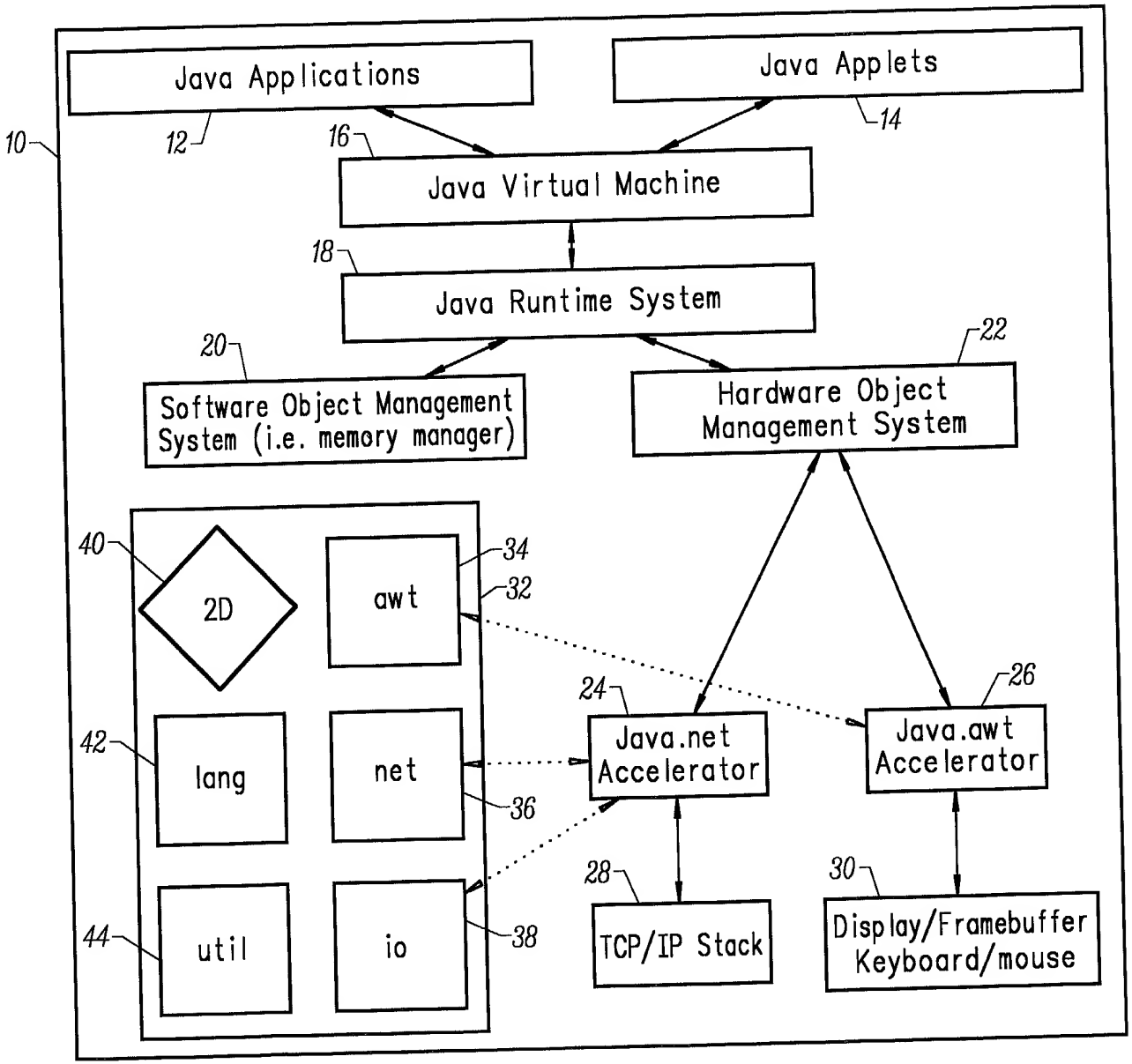

Java Applications
Java Applets
12
14
10
16
Java Virtual Machine
18
Java Runtime System
20
22
Software Object Management System (i.e. memory manager)
Hardware Object Management System
40
2D
awt
34
32
24
26
42
lang
net
Java.net Accelerator
Java.awt Accelerator
36
28
30
44
util
io
38
TCP/IP Stack
Display/Framebuffer Keyboard/mouse

FIG. 1

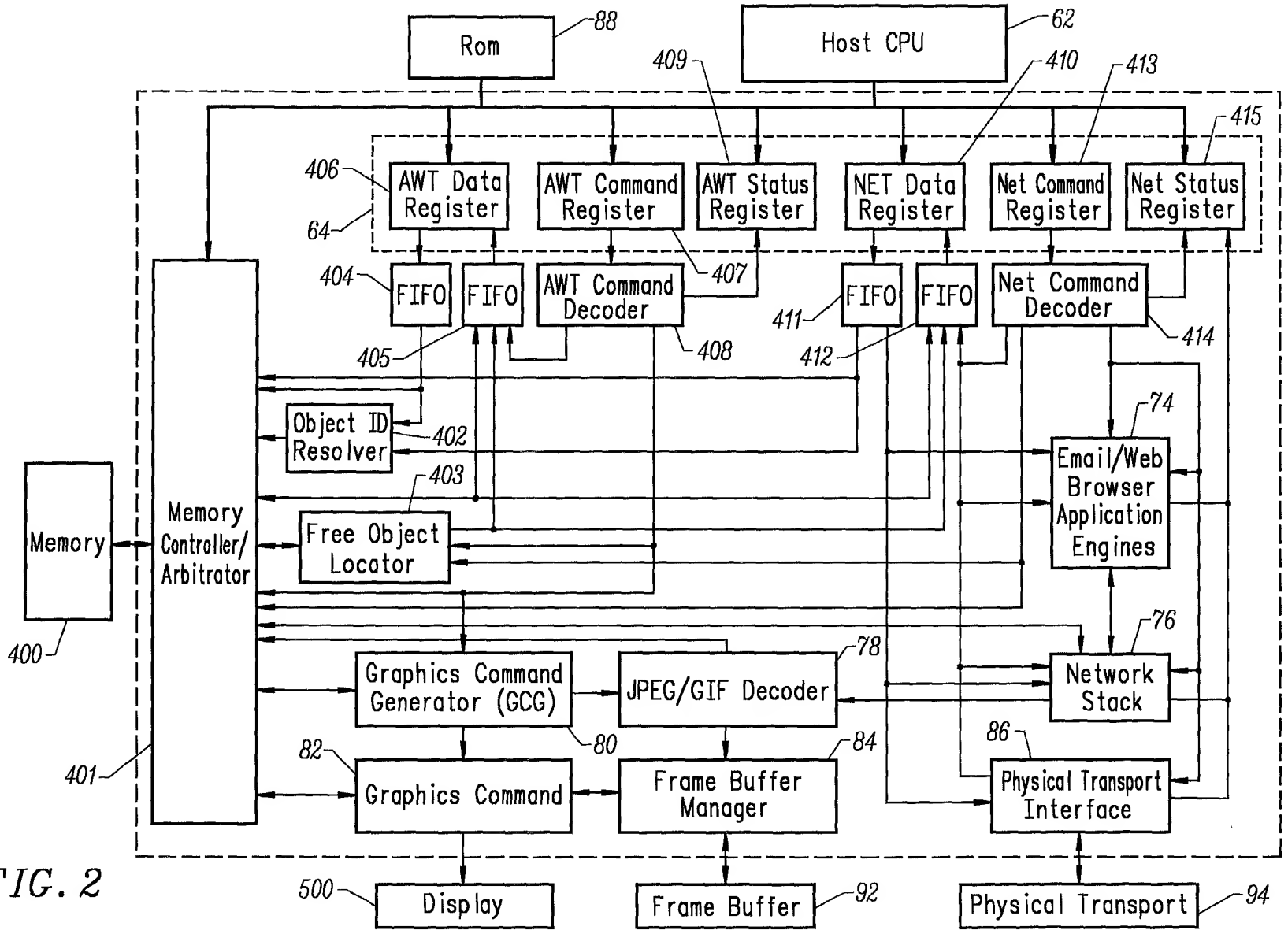

Rom
88
Host CPU
62
409
410
413
415
406
64
AWT Data Register
AWT Command Register
AWT Status Register
NET Data Register
Net Command Register
Net Status Register
404
FIFO
FIFO
AWT Command Decoder
407
411
FIFO
FIFO
Net Command Decoder
414
405
408
412
Object ID Resolver
402
74
403
Email/Web Browser Application Engines
Memory
Memory Controller/ Arbitrator
Free Object Locator
400
76
78
Graphics Command Generator (GCG)
JPEG/GIF Decoder
Network Stack
80
86
82
84
401
Graphics Command
Frame Buffer Manager
Physical Transport Interface
500
Display
Frame Buffer
92
Physical Transport
94

FIG. 2

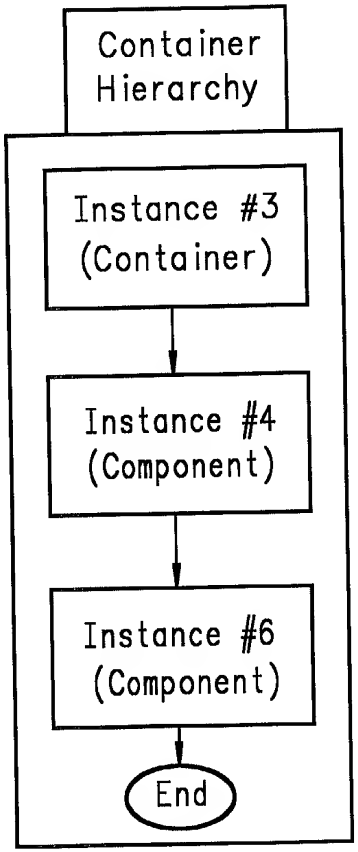

Container Hierarchy
Instance #3 (Container)
Instance #4 (Component)
Instance #6 (Component)
End

FIG. 4

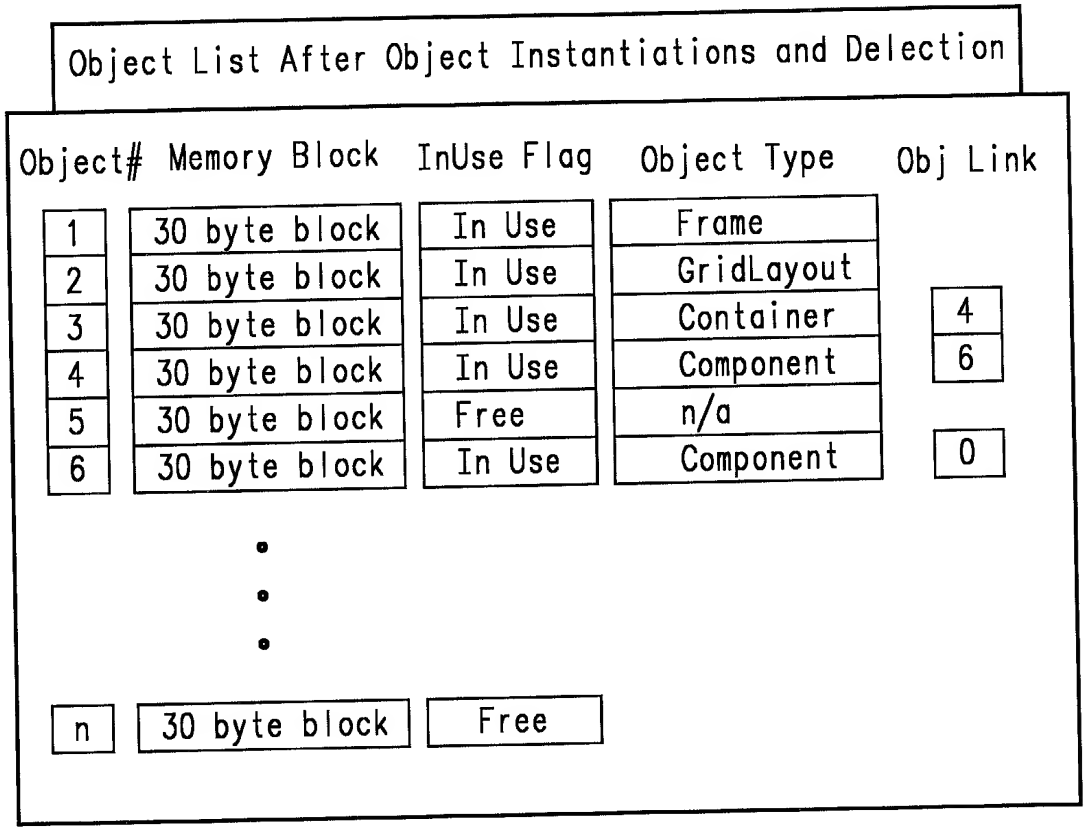
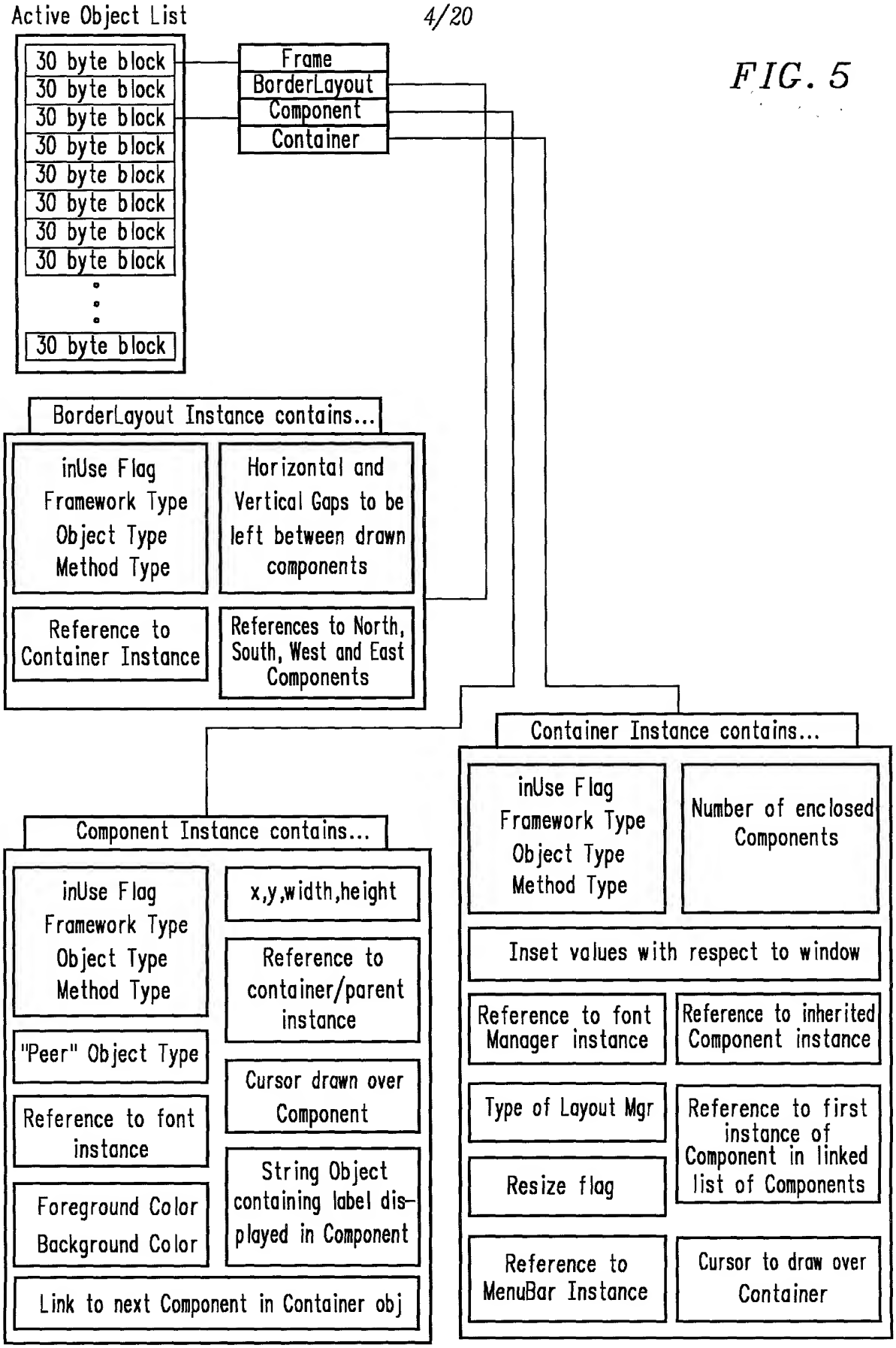

Object List After Object Instantiations and Delection
Object# Memory Block InUse Flag Object Type Obj Link
1 30 byte block In Use Frame
2 30 byte block In Use GridLayout
3 30 byte block In Use Container 4
4 30 byte block In Use Component 6
5 30 byte block Free n/a
6 30 byte block In Use Component 0
n 30 byte block Free

FIG. 3

FIG. 5




D9656167 050200

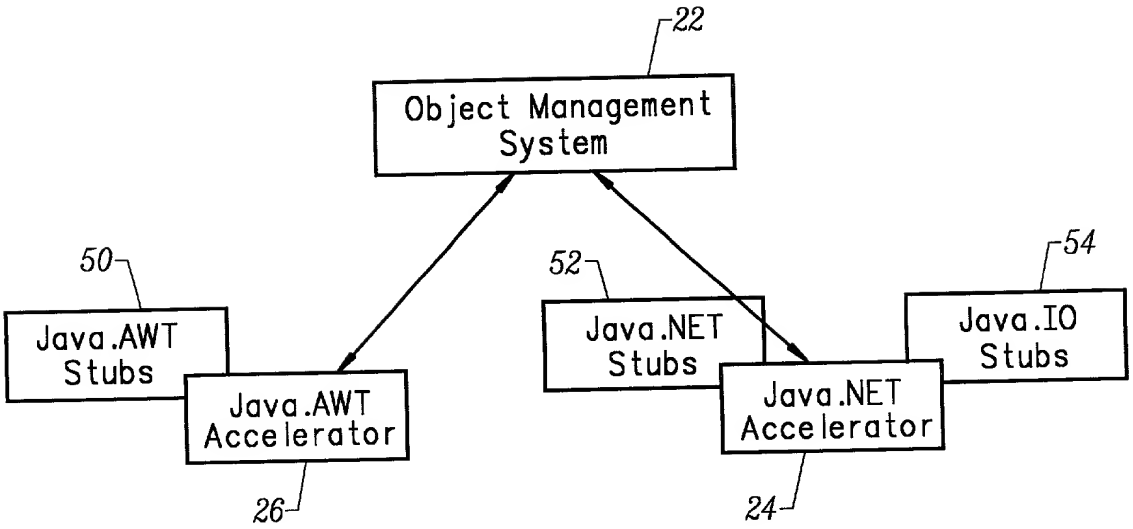

22
Object Management System
50
Java.AWT Stubs
Java.AWT Accelerator
26
52
Java.NET Stubs
Java.NET Accelerator
24
54
Java.IO Stubs

FIG. 6

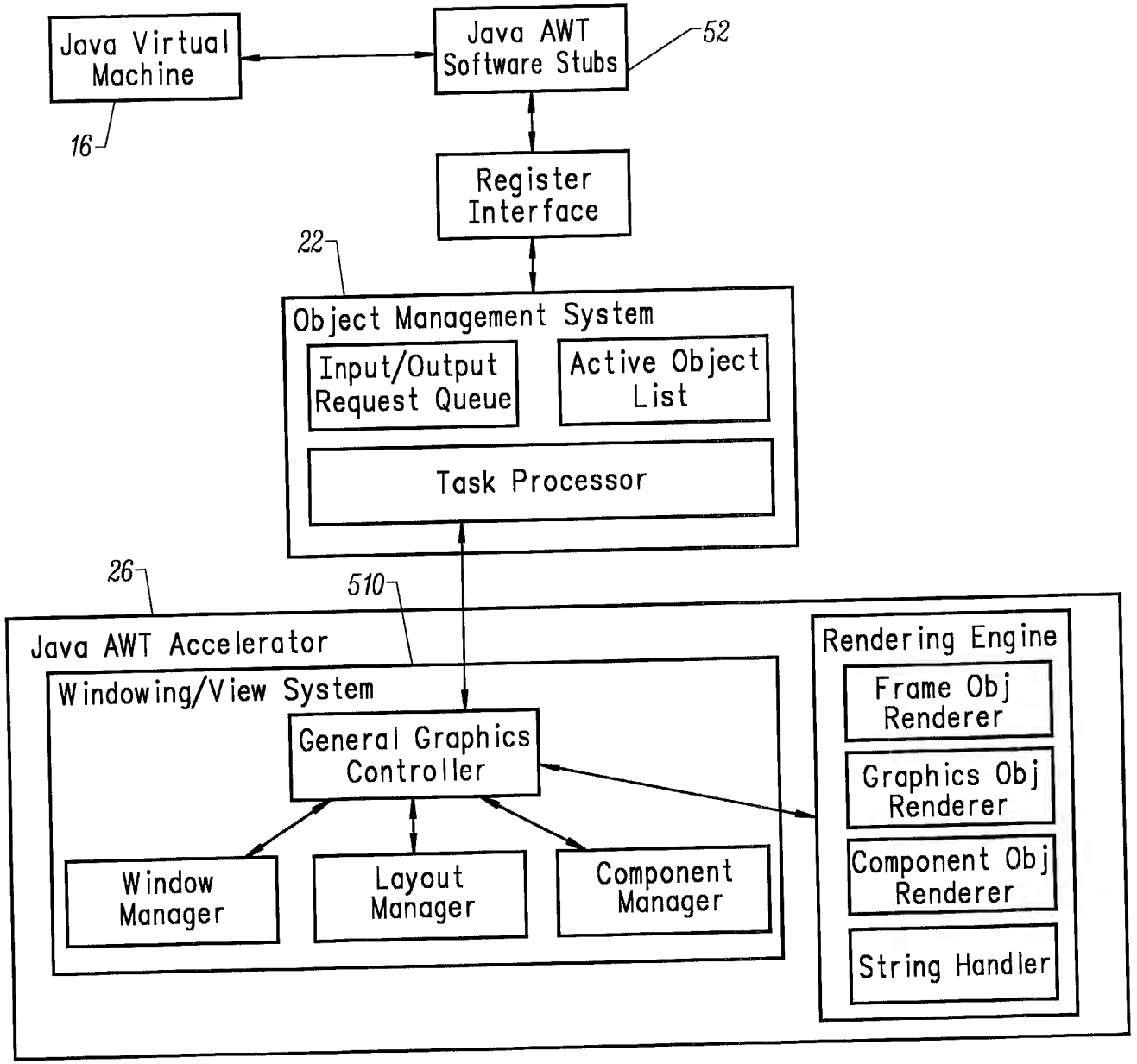

Java Virtual Machine
16
Java AWT Software Stubs
52
Register Interface
22
Object Management System
Input/Output Request Queue
Active Object List
Task Processor
26
510
Java AWT Accelerator
Windowing/View System
General Graphics Controller
Window Manager
Layout Manager
Component Manager
Rendering Engine
Frame Obj Renderer
Graphics Obj Renderer
Component Obj Renderer
String Handler

FIG. 7

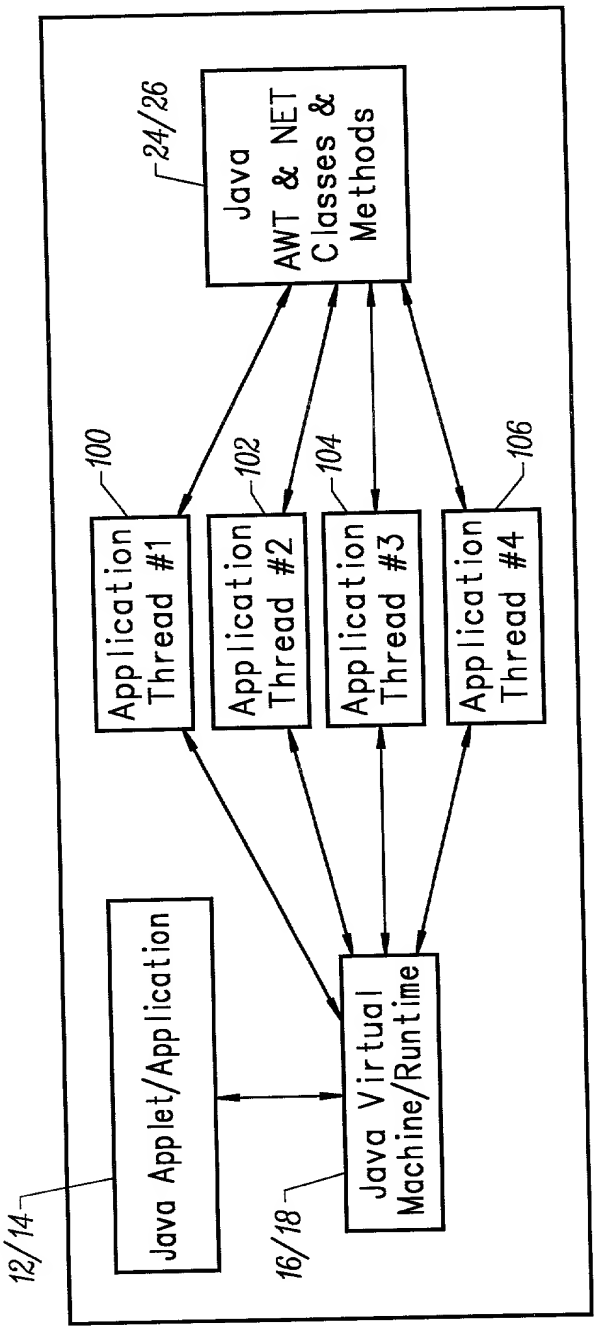

12/14
Java Applet/Application
16/18
Java Virtual Machine/Runtime
24/26
Java AWT & NET Classes & Methods
100
Application Thread #1
102
Application Thread #2
104
Application Thread #3
106
Application Thread #4

FIG. 8

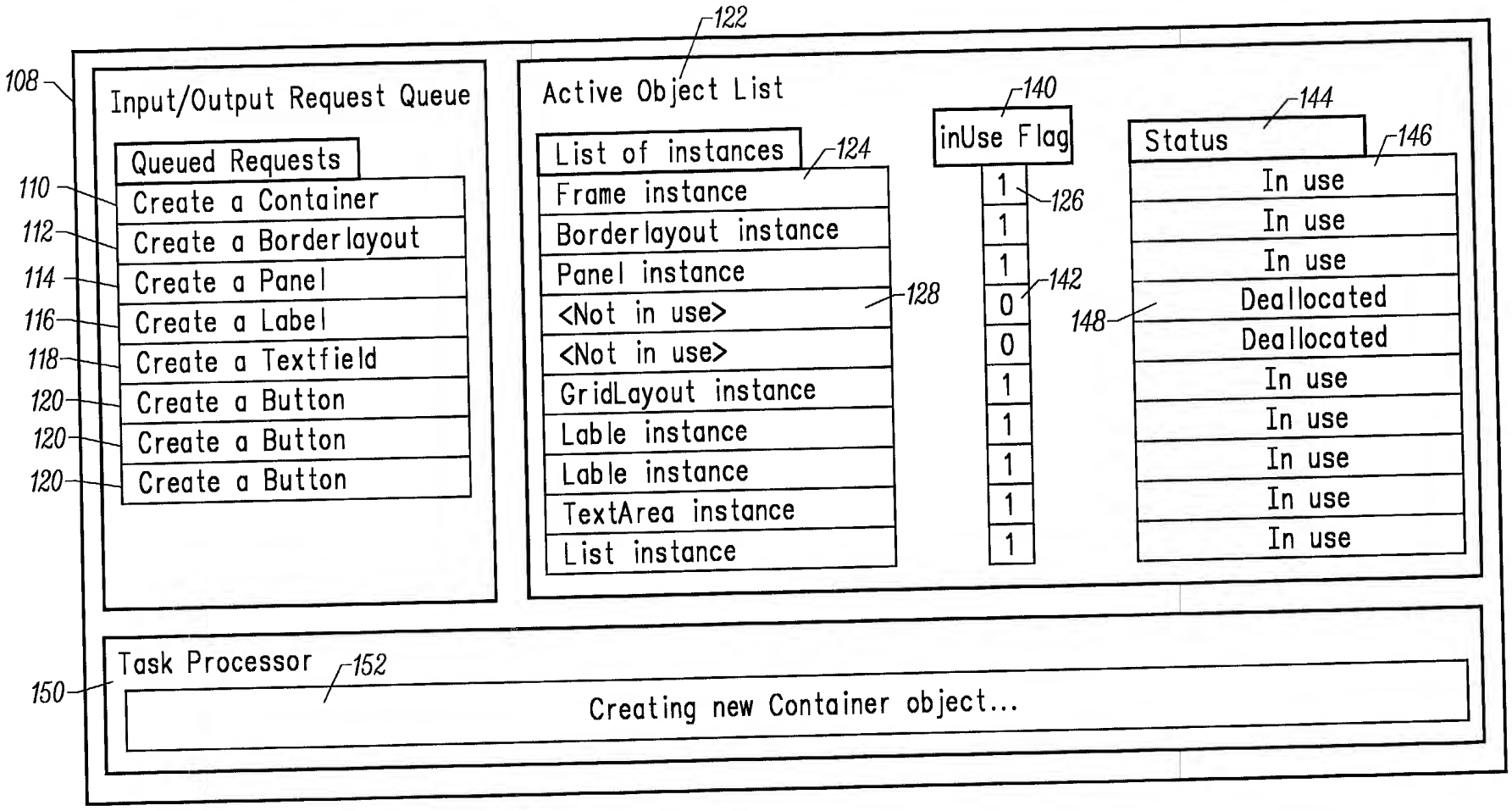
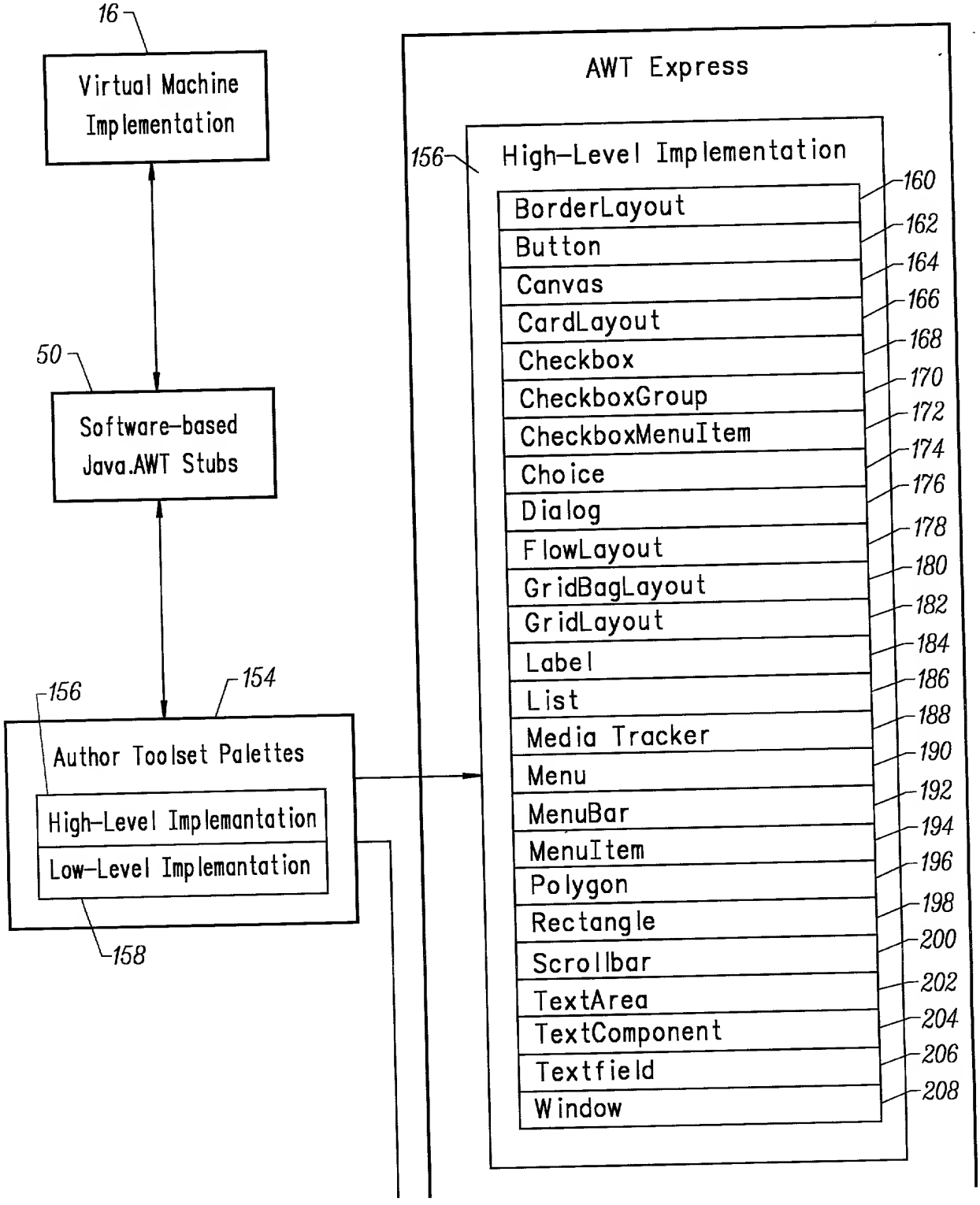

108
Input/Output Request Queue
Queued Requests
110
Create a Container
112
Create a Borderlayout
114
Create a Panel
116
Create a Label
118
Create a Textfield
120
Create a Button
120
Create a Button
120
Create a Button
122
Active Object List
List of instances
124
Frame instance
Borderlayout instance
Panel instance
<Not in use>
128
<Not in use>
GridLayout instance
Lable instance
Lable instance
TextArea instance
List instance
140
inUse Flag
1
126
1
1
142
0
0
1
1
1
1
1
144
Status
146
In use
In use
In use
Deallocated
148
Deallocated
In use
In use
In use
In use
In use
150
Task Processor
152
Creating new Container object...

*FIG. 9*




See FIG. 10B

*FIG. 10A*

See FIG. 10A

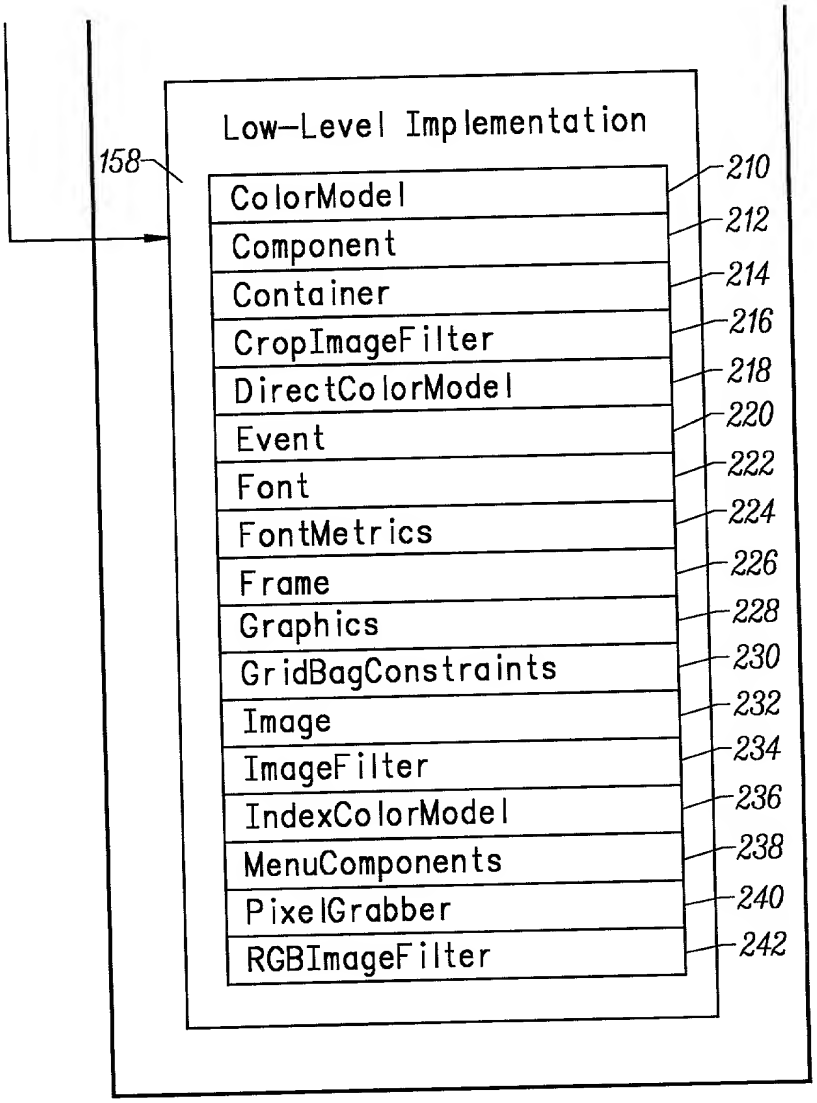



FIG. 10B

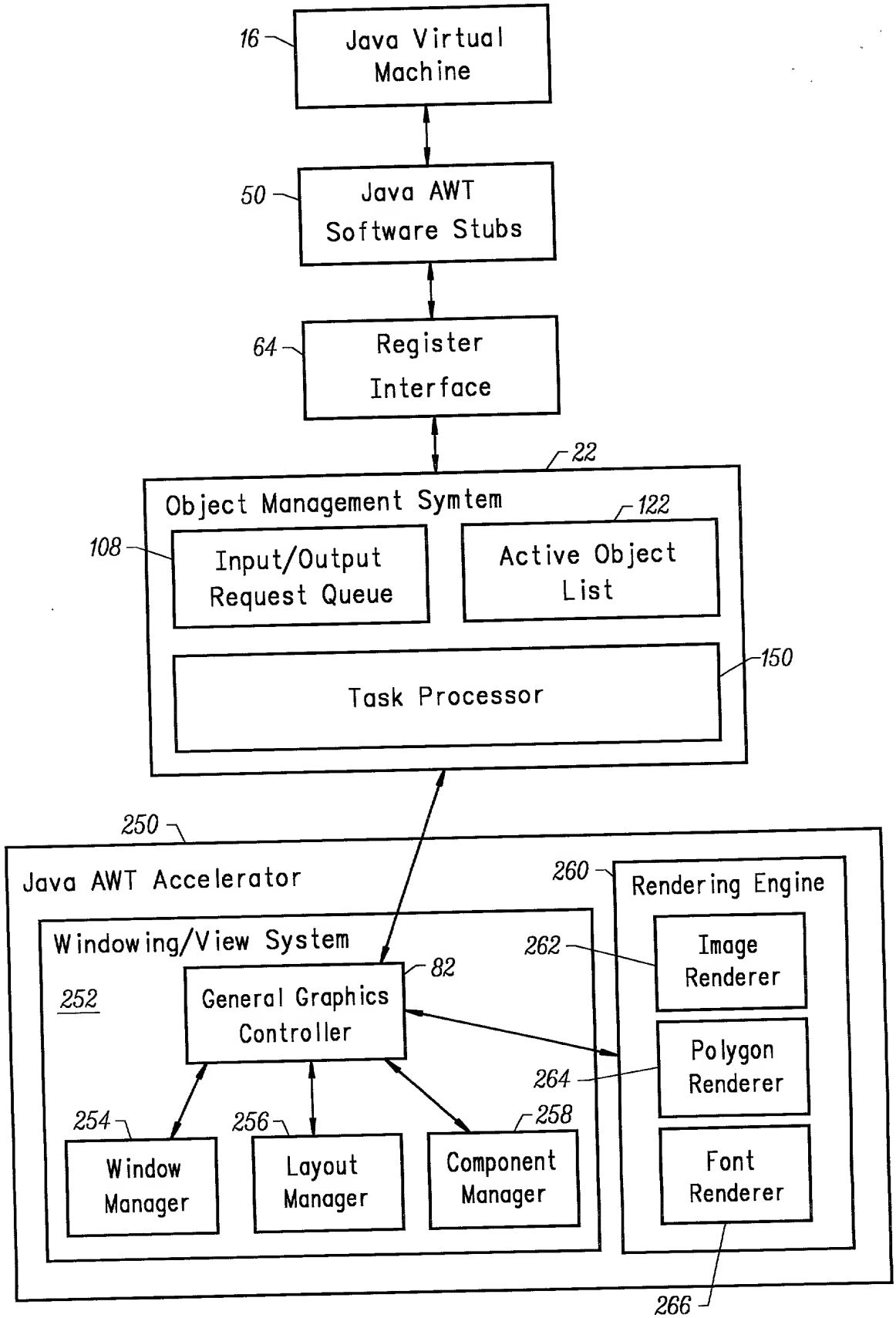

16
Java Virtual Machine
50
Java AWT Software Stubs
64
Register Interface
22
Object Management Symtem
122
108
Input/Output Request Queue
Active Object List
150
Task Processor
250
Java AWT Accelerator
260
Rendering Engine
Windowing/View System
262
Image Renderer
82
252
General Graphics Controller
Polygon Renderer
264
254
256
258
Window Manager
Layout Manager
Component Manager
Font Renderer
266

FIG. 11

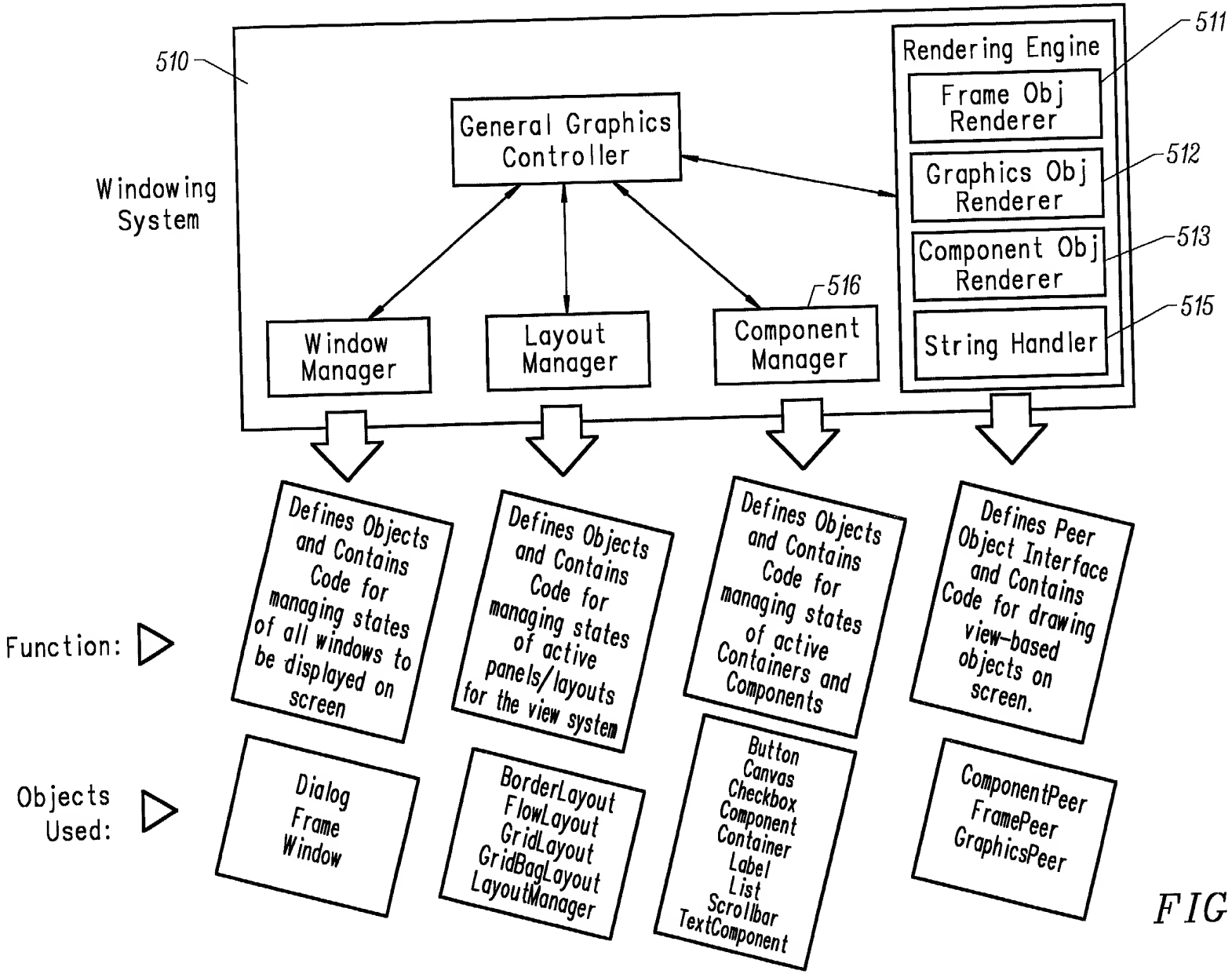

510
Windowing System
General Graphics Controller
Rendering Engine
511
Frame Obj Renderer
512
Graphics Obj Renderer
513
Component Obj Renderer
515
String Handler
516
Window Manager
Layout Manager
Component Manager
Function:
Defines Objects and Contains Code for managing states of all windows to be displayed on screen
Defines Objects and Contains Code for managing states of active panels/layouts for the view system
Defines Objects and Contains Code for managing states of active Containers and Components
Defines Peer Object Interface and Contains Code for drawing view-based objects on screen.
Objects Used:
Dialog
Frame
Window
BorderLayout
FlowLayout
GridLayout
GridBagLayout
LayoutManager
Button
Canvas
Checkbox
Component
Container
Label
List
Scrollbar
TextComponent
ComponentPeer
FramePeer
GraphicsPeer

FIG. 12

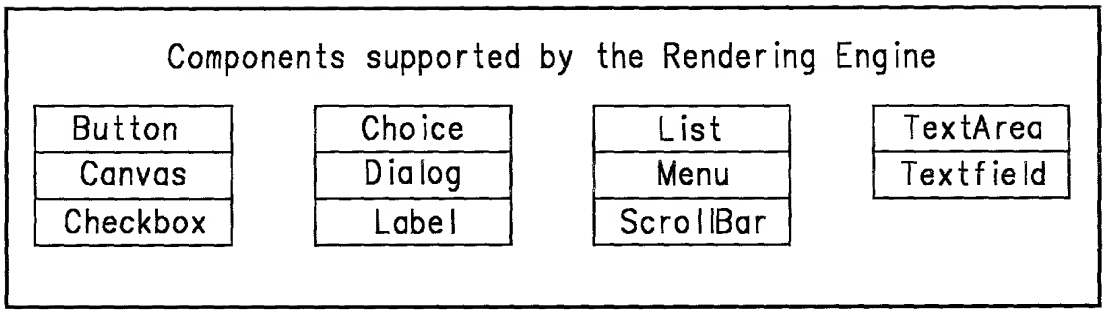



*FIG. 13*

Docket No. 50277-0001

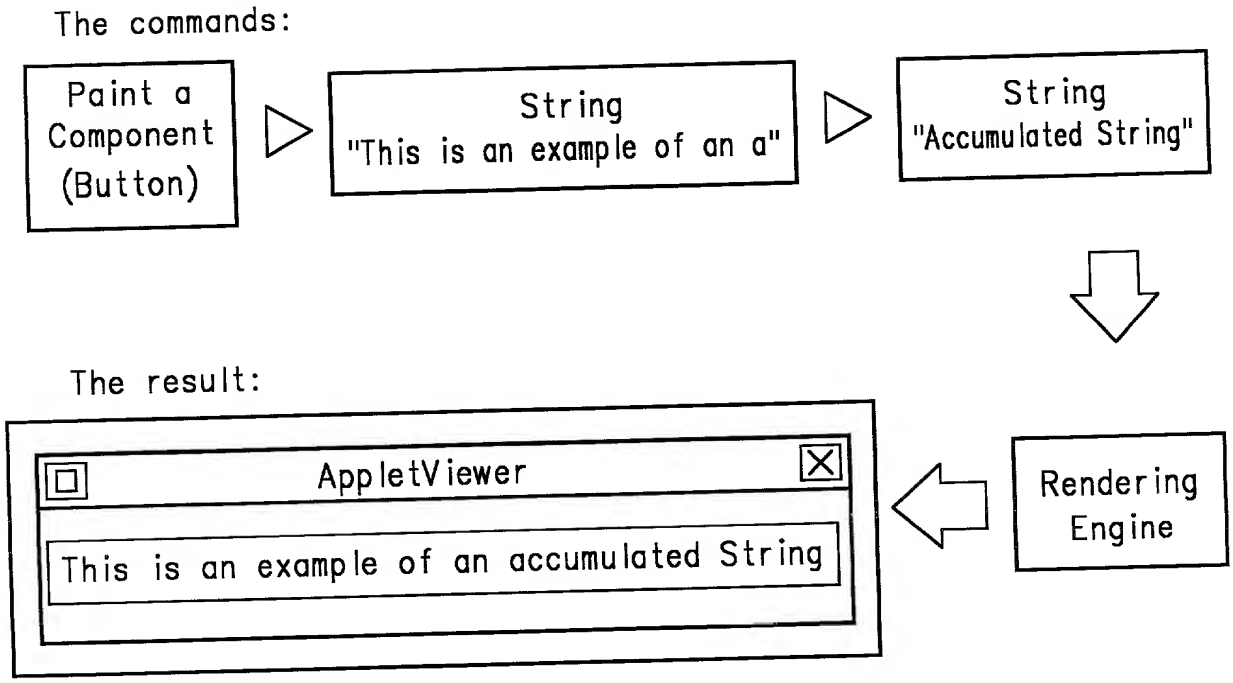



FIG. 14

Painting Methods:

| | |
|---|---|
| clearRect | drawRect |
| clipRect | drawRoundRect |
| copyArea | fill3DRect |
| draw3DRect | fillArc |
| drawArc | fillOval |
| drawLine | fillPolygon |
| drawOval | fillRect |
| drawPolygon | fillRoundRect |

Other Methods:

| | |
|---|---|
| drawImage | setFont |
| drawString | setPaintMode |
| setColor | translate |

FIG. 15

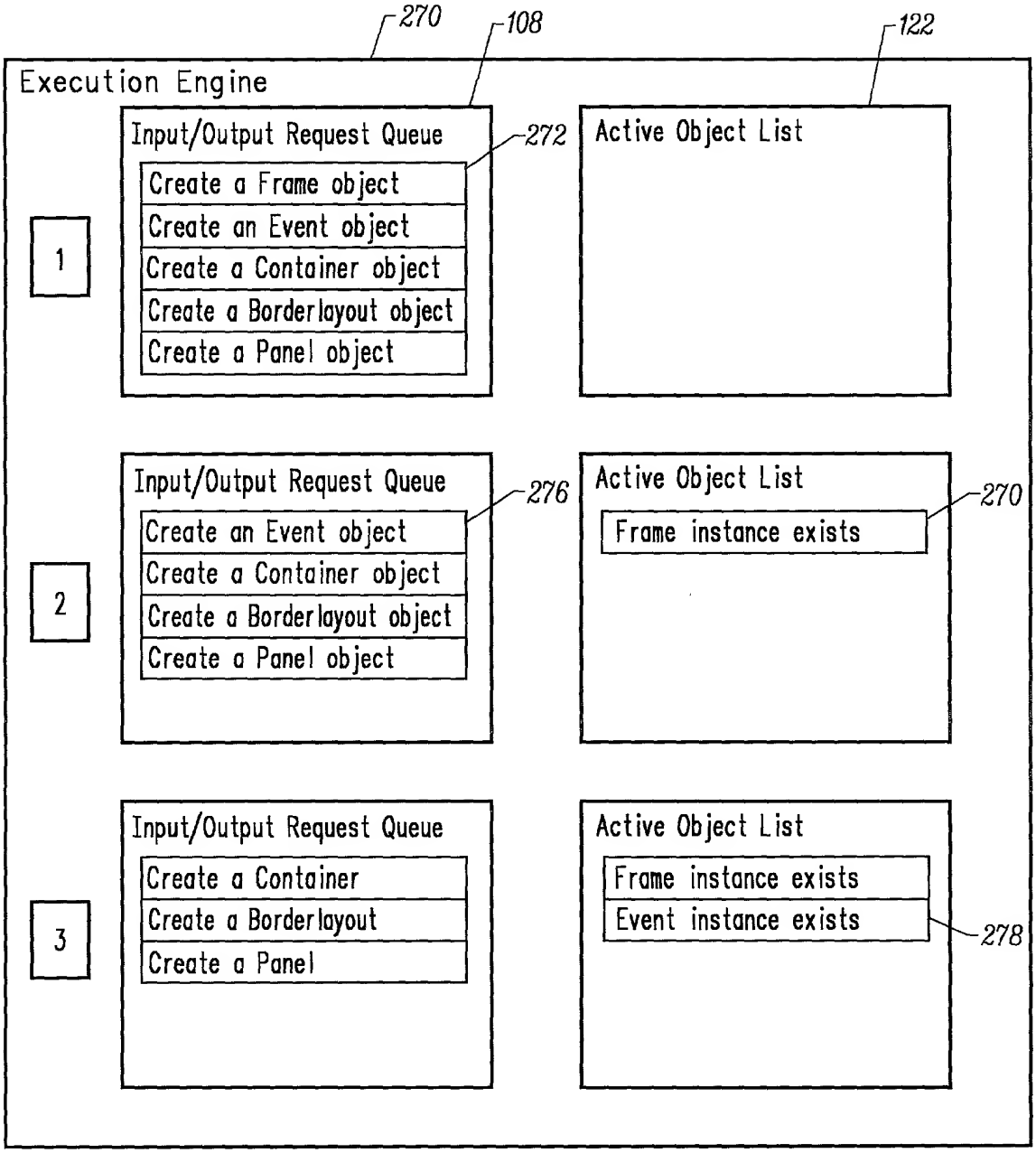

270
108
122
Execution Engine
Input/Output Request Queue
272
Create a Frame object
Create an Event object
Create a Container object
Create a Borderlayout object
Create a Panel object
Active Object List
1
Input/Output Request Queue
276
Create an Event object
Create a Container object
Create a Borderlayout object
Create a Panel object
Active Object List
270
Frame instance exists
2
Input/Output Request Queue
Create a Container
Create a Borderlayout
Create a Panel
Active Object List
Frame instance exists
Event instance exists
278
3

FIG. 16

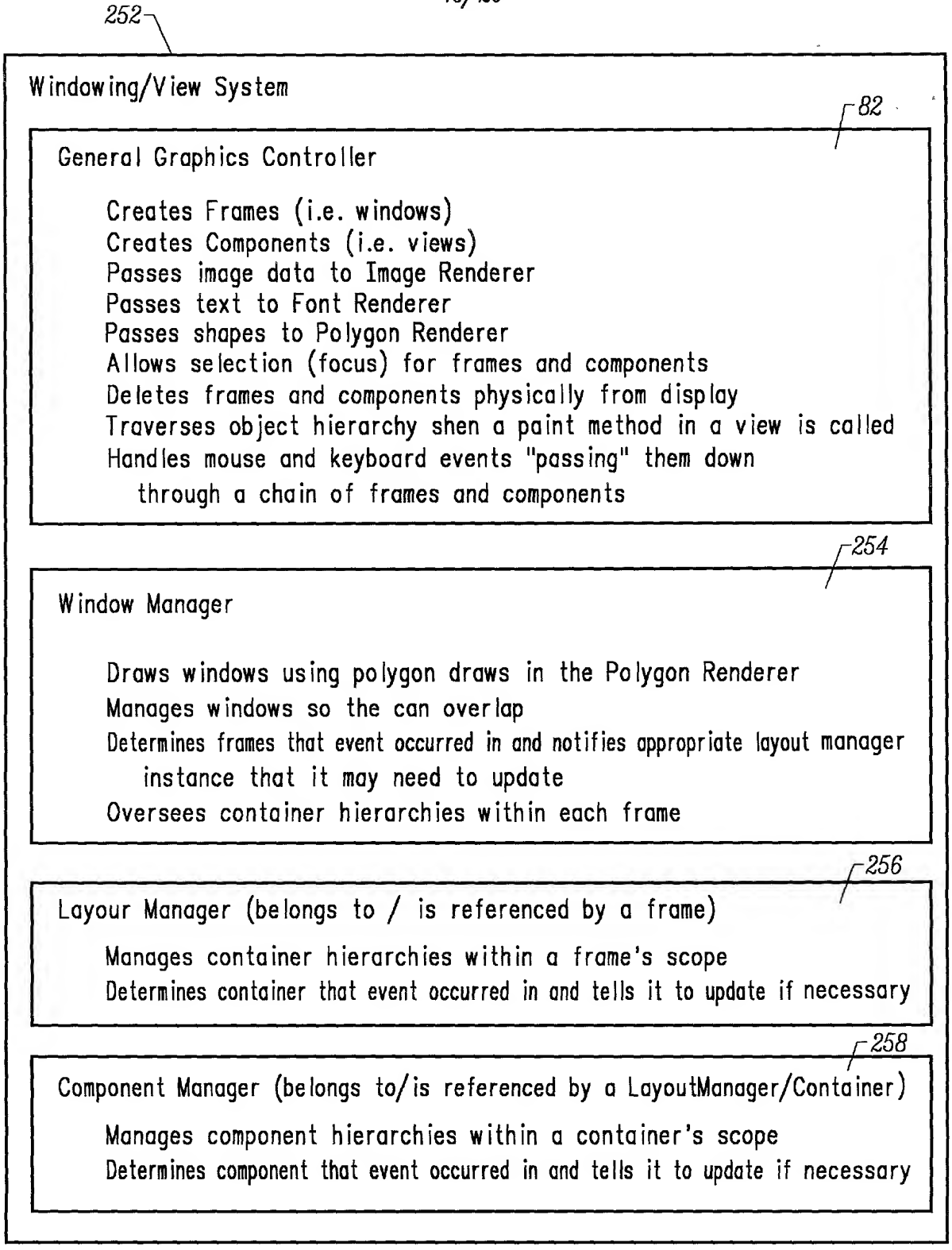



FIG. 17

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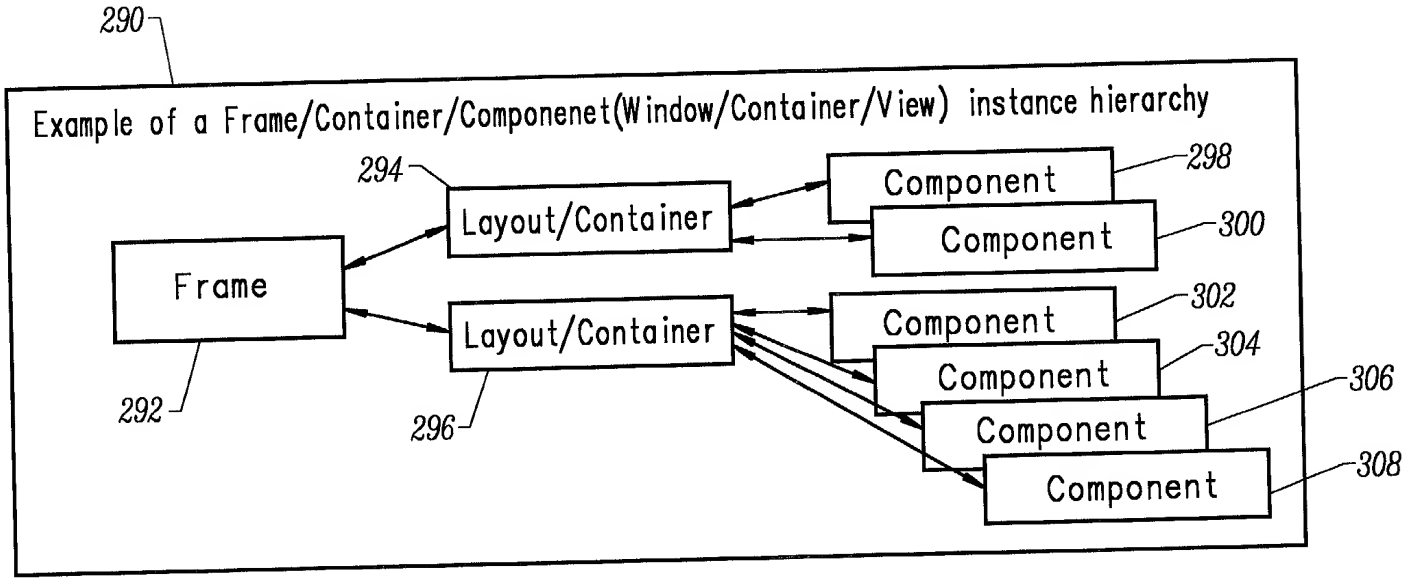
290
Example of a Frame/Container/Componenet(Window/Container/View) instance hierarchy
294
Layout/Container
Component
298
Component
300
Frame
Layout/Container
Component
302
Component
304
Component
306
Component
308
292
296

*FIG. 18*

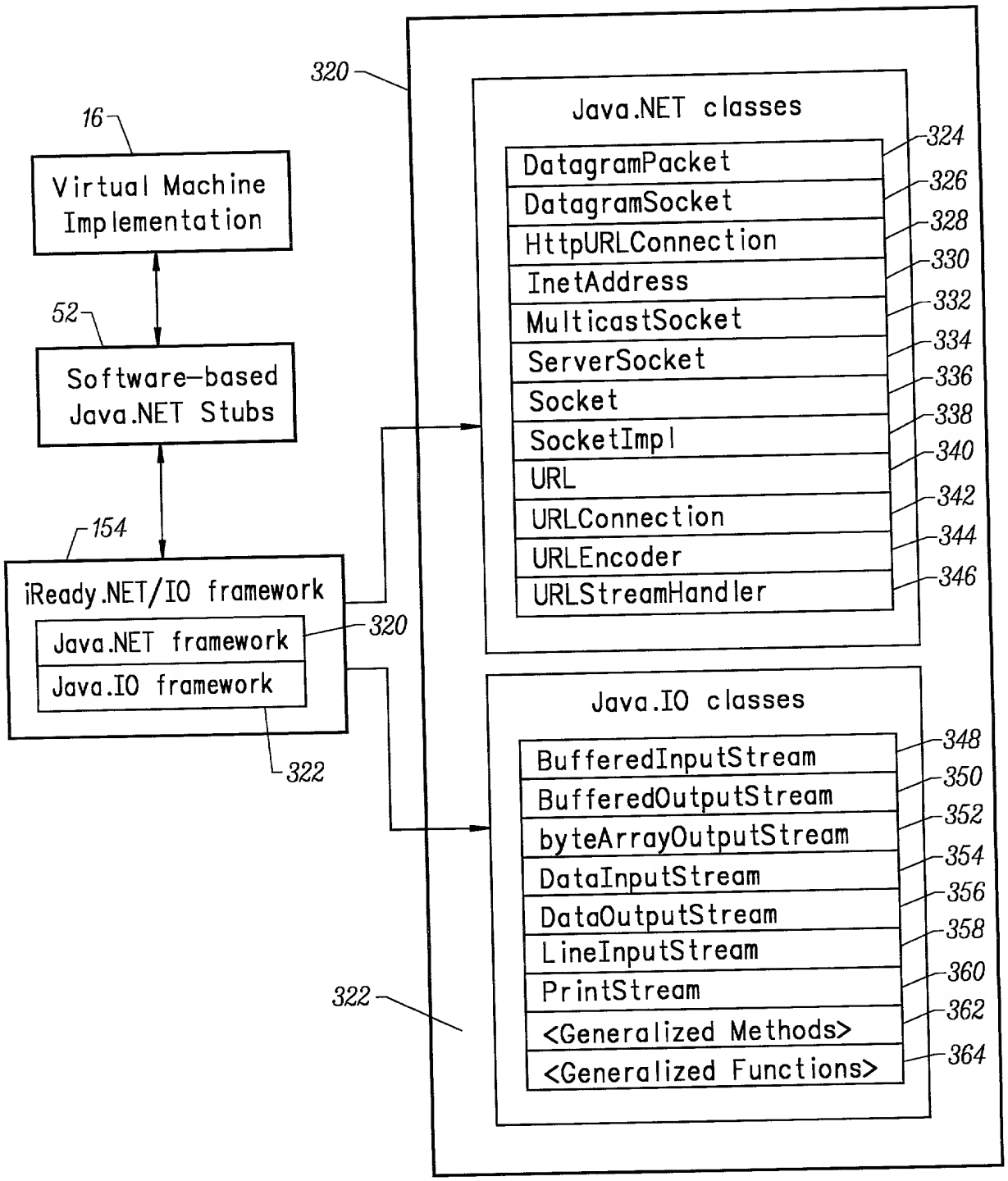
16
Virtual Machine Implementation
52
Software-based Java.NET Stubs
154
iReady.NET/IO framework
Java.NET framework
Java.IO framework
320
322
320
Java.NET classes
DatagramPacket
DatagramSocket
HttpURLConnection
InetAddress
MulticastSocket
ServerSocket
Socket
SocketImpl
URL
URLConnection
URLEncoder
URLStreamHandler
324
326
328
330
332
334
336
338
340
342
344
346
322
Java.IO classes
BufferedInputStream
BufferedOutputStream
byteArrayOutputStream
DataInputStream
DataOutputStream
LineInputStream
PrintStream
<Generalized Methods>
<Generalized Functions>
348
350
352
354
356
358
360
362
364

FIG. 19

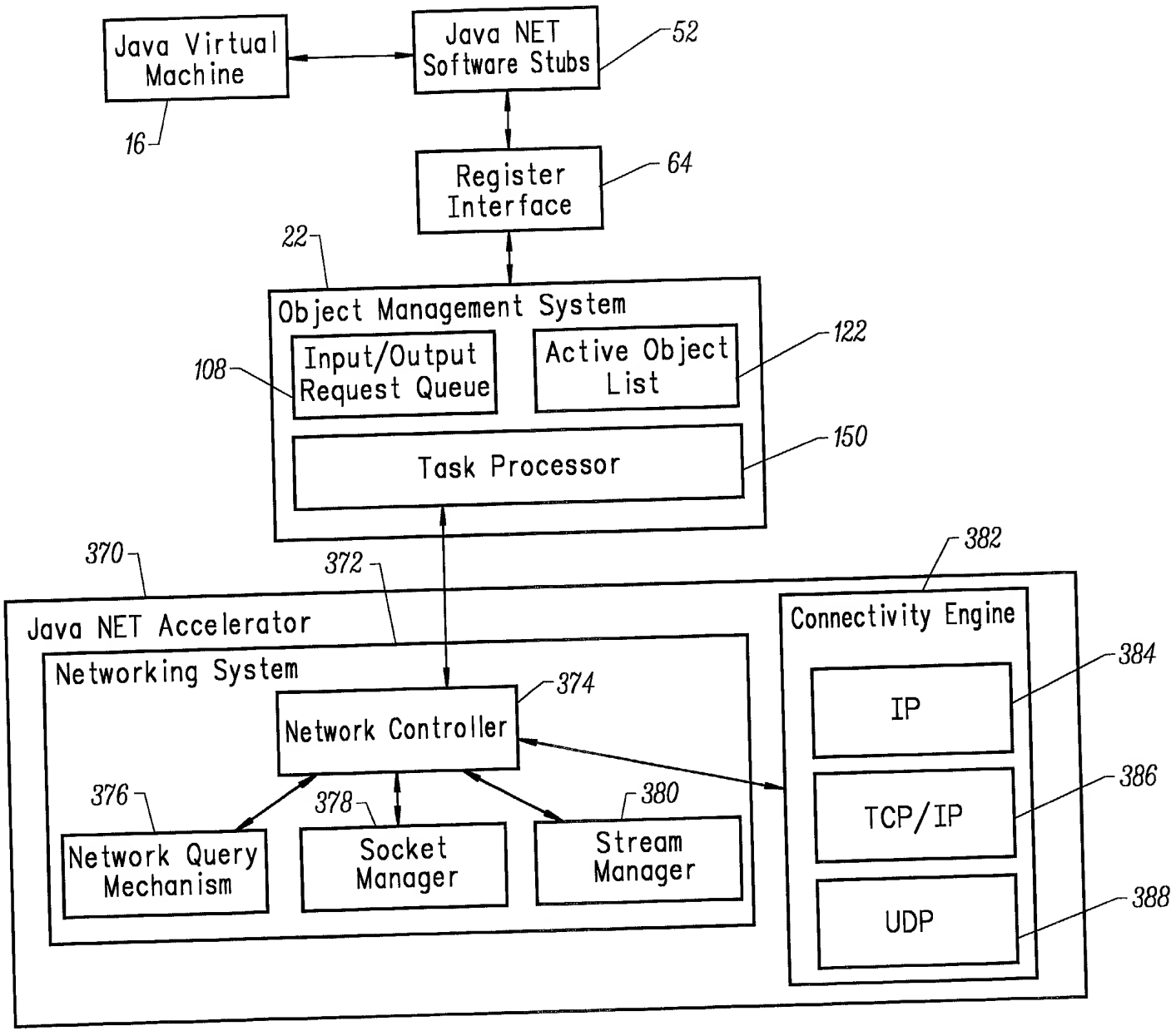
Java Virtual Machine
16
Java NET Software Stubs
52
Register Interface
64
22
Object Management System
Input/Output Request Queue
108
Active Object List
122
Task Processor
150
370
372
382
Java NET Accelerator
Networking System
Network Controller
374
Connectivity Engine
IP
384
TCP/IP
386
UDP
388
376
Network Query Mechanism
378
Socket Manager
380
Stream Manager

FIG. 20

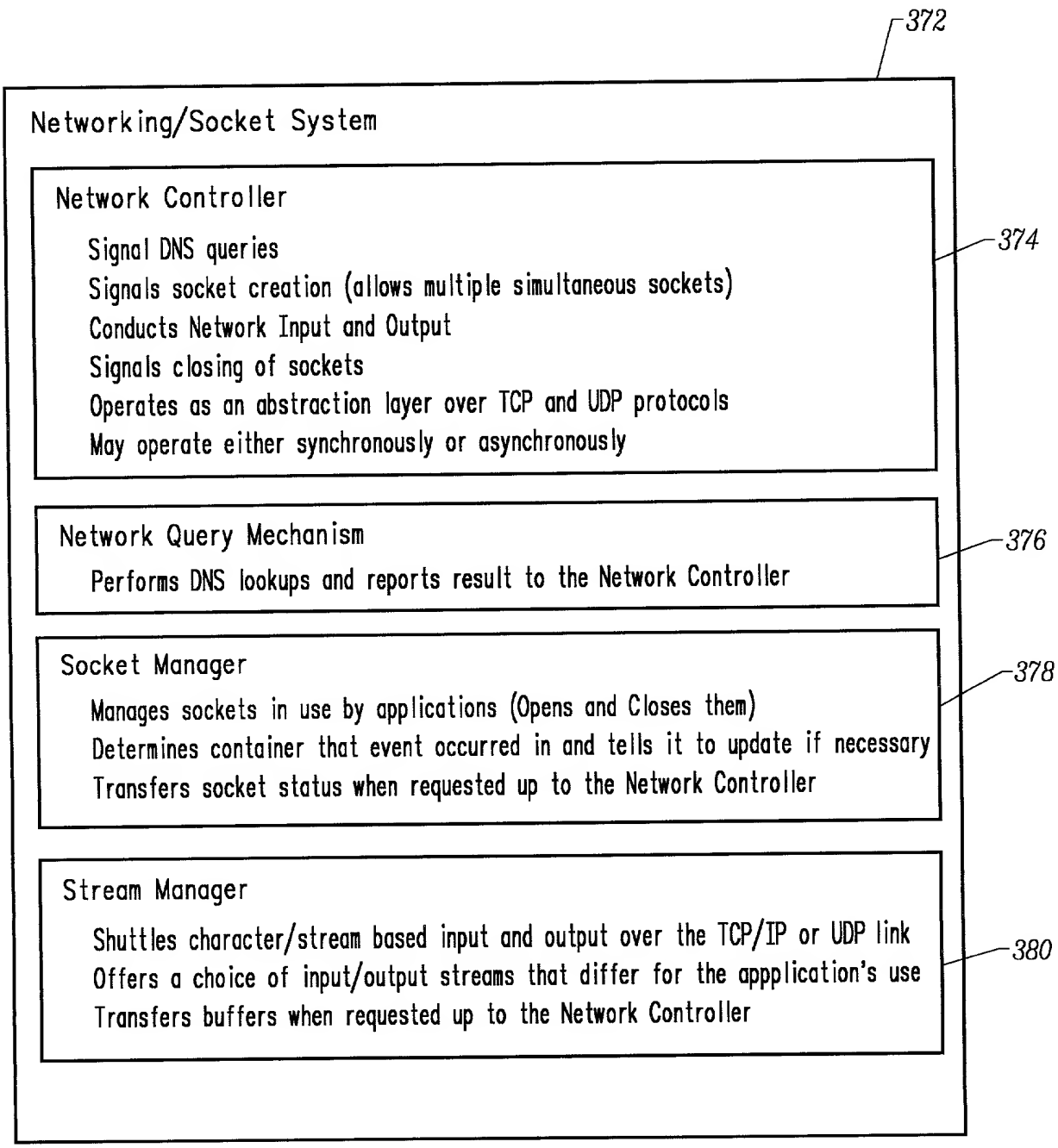
372
Networking/Socket System
Network Controller
Signal DNS queries
Signals socket creation (allows multiple simultaneous sockets)
Conducts Network Input and Output
Signals closing of sockets
Operates as an abstraction layer over TCP and UDP protocols
May operate either synchronously or asynchronously
374
Network Query Mechanism
Performs DNS lookups and reports result to the Network Controller
376
Socket Manager
Manages sockets in use by applications (Opens and Closes them)
Determines container that event occurred in and tells it to update if necessary
Transfers socket status when requested up to the Network Controller
378
Stream Manager
Shuttles character/stream based input and output over the TCP/IP or UDP link
Offers a choice of input/output streams that differ for the appplication's use
Transfers buffers when requested up to the Network Controller
380

FIG. 21